U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-528/90-56, 50-529/90-56, 50-530/90-56

License No. NPF-41, NPF-51, NPF-74

Licensee: Arizona Public Service Company
P. O. Box 52034
Phoenix, Arizona 85072-2034

Facility Name: Palo Verde Nuclear Generating Station Units 1, 2 and 3

Inspection at: Wintersburg, Arizona

Inspection Conducted: December 3-7, 1990

Inspected by: GP Yuhas for 12/28/90
W. K. Kennbrook, Radiation Specialist — Date Signed

12/24/90
L. Cobleniz, Radiation Specialist — Date Signed

Approved by: G.P. Yuhas 12/28/90
G. P. Yuhas, Chief — Date Signed
Reactor Radiological Protection Branch

Summary:

Areas Inspected: Inspection of water chemistry control and chemical analysis, radiochemical analysis, inspector followup items and allegations. Inspection procedures 92701, 84750 and 79701 were used.

Results: The licensee's performance in analytical chemistry and system water quality had improved. However, the licensee lacked several recommended on-line monitoring instruments for important secondary chemistry measurements. The licensee's capabilities for gamma isotopic measurements had declined, given errors in the details of the nuclide libraries and the inconsistent nuclide identification by counting systems from different units. One item concerning quantification of particulates on iodine cartridges remained unresolved.

DETAILS

1. Persons Contacted

W. Blaxton, Chemistry Supervisor, Unit 1
T. Bradish, Manager, Compliance
J. Draper, Site Representative, Southern California Edison Company
R. Ferro, Supervisor, Chemistry Technical Services
P. Guay, Chemistry Manager, Unit 3
R. Hazelwood, Supervisor, Quality Assurance
R. Henry, Site Representative, Salt River Project
H. Hurley, Chemistry Supervisor, Unit 3
L. Johnson, Chemistry Manager, Unit 2
D. Larkin, Senior Engineer, Compliance
W. Lui, Supervisor, Instrumentation & Control Engineering
J. Santi, Chemistry Supervisor, Unit 2
J. A. Scott, General Manager, Site Chemistry
T. Shriver, Assistant Plant Manager, Unit 2
R. Siddell, Technical Advisor, Chemistry, Unit 1
R. Sorensen, Manager, Chemistry Technical Services

The persons listed above attended the exit meeting held December 7, 1990.

2. Followup (92701)

Open Item 50-528/89-17-01 (Closed), 50-529/89-17-01 (Closed), 50-530/89-17-01 (Closed): This item concerned the consistency and accuracy of measurements of radiostrontium in interlaboratory blind samples. With the exception of one Unit 3 analysis during the first quarter of 1990, the Unit laboratories had achieved consistent agreement with the certified strontium activity. The inspector had no further questions in this matter.

Open Item 50-528/89-17-02 (Closed): This item concerned the identification of water samples to be distilled prior to tritium analysis. Procedure 74CH-9ZZ59, "Tritium," had been revised to provide appropriate guidance.

Open Item 50-528/89-17-03 (Closed), 50-529/89-17-02 (Closed), 50-530/89-17-02 (Closed): This item concerned corrective actions for spray pond chemical addition problems identified in Quality Audit Group Reports 89-004 and 89-025. The audits documented that the spray pond chemical addition systems had been chronically failing at all Units and that spray pond chemistry had not been consistent. The inspector noted that bulk chemical additions were no longer necessary, as the chemical addition systems had been made more reliable. Intermittent problems with chemical addition hardware occasionally occurred, but spray pond chemistry was consistently maintained within specification. The inspector had no further concerns regarding spray pond chemical additions. Corrosion of the balance of the spray pond system will be addressed during routine inspections.

3. Confirmatory Measurements and Radiochemical Analysis (84750)

The regional mobile laboratory trailer was brought onsite for gamma isotopic intercomparisons with the licensee's counting laboratories. Sample types commonly analyzed for compliance with regulatory requirements were analyzed by the licensee and the NRC, and the results were compared using the NRC verification test criteria.

The first samples analyzed were a particulate filter and charcoal cartridge removed from Unit 1 process monitor RU-1, containment atmosphere monitor. The particulate filter analysis was compared with Unit 1 only. The results are presented in Table 1.

Table 1

Unit 1 Containment Atmosphere Particulates

Analyte	Licensee Result	NRC Result	NRC Random Uncertainty	Ratio: Licensee/NRC	Agreement Range
I-131	1.74E-14	2.19E-14	2.88E-15	0.8	0.5-2.00
Cs-137	9.23E-15	1.28E-14	3.26E-15	0.72	No Comparison

The measurements agreed well considering the high counting uncertainties. The activity on the filter was a very small fraction of the Maximum Permissible Concentration (MPC) of 10 CFR 20, Appendix B, Table I.

The iodine cartridge was exchanged between all Unit laboratories and the NRC. The results are given in Table 2.

Table 2

Unit 1 Containment Atmosphere Halogens

Unit	Analyte	Licensee Result	NRC Result	NRC Random Uncertainty	Ratio: Licensee/NRC	Agreement Range
U1	Br-82	8.22E-12	5.86E-12	8.40E-14	1.4	0.80-1.25
U1	Cs-134	2.39E-13	1.79E-13	2.41E-14	1.33	0.5-2.00
U1	I-131	3.64E-10	2.63E-10	3.00E-13	1.39	0.85-1.18
U1	I-133	2.76E-11	2.05E-11	1.50E-13	1.35	0.80-1.25
U1	Cs-137	2.64E-13	2.85E-13	3.16E-14	0.93	0.6-1.66
U2	Br-82	6.11E-12	5.86E-12	8.40E-14	1.04	0.80-1.25
U2	Cs-134	2.10E-13	1.79E-13	2.41E-14	1.17	0.5-2.00
U2	I-131	2.50E-10	2.63E-10	3.00E-13	0.95	0.85-1.18
U2	I-133	2.00E-11	2.05E-11	1.50E-13	0.97	0.80-1.25
U2	Cs-137	3.08E-13	2.85E-13	3.16E-14	1.08	0.6-1.66
U3	Br-82	6.29E-12	5.86E-12	8.40E-14	1.07	0.80-1.25
U3	Cs-134	0.00E+00	1.79E-13	2.41E-14	0	0.5-2.00
U3	I-131	2.88E-10	2.63E-10	3.00E-13	1.1	0.85-1.18

U3	I-133	2.21E-11	2.05E-11	1.50E-13	1.08	0.80-1.25
U3	Cs-137	0.00E+00	2.85E-13	3.16E-14	0	0.6-1.66

The results for Unit 2 agreed. Unit 3 did not identify Cs-134 and Cs-137 on the cartridge, as their library was prepared for halogens only. Technical Specification Table 4.11-2 specified that grab samples (short duration particulate and iodine samples) were to be obtained from containment prior to each release. No particulates were observed on the required grab samples from RU-1. The inspector and Unit 3 effluent/Radiation Monitoring System (RMS) personnel discussed the need to survey cartridges for particulates. The licensee stated that particulates detected on iodine cartridges were accounted for by reanalysis with a library containing particulates. The inspector will verify the licensee's surveys for particulates on cartridges during a subsequent inspection. This item is unresolved (50-530/90-56-01). An unresolved item is a matter about which more information is required to ascertain whether it is an acceptable item, a deviation, or a violation.

The Unit 1 analysis for radioiodines disagreed with NRC and the other Unit laboratories. The inspector requested that the licensee verify the detector efficiency calibration by analysis of a calibration standard and reproduction of the certified activity. The Unit 1 analysis of the standard agreed very closely with the certified activity. An independent analysis by another Unit confirmed the standard activity. After reviewing the data from the initial comparison and the results of the standard verification, the inspector concluded there was no systematic problem with the cartridge analysis, but that the Unit 1 analysis had been affected by an undetermined and isolated error. Based on verification of the standard activity, the inspector considered the disagreement resolved.

The third sample was reactor coolant obtained from Unit 2. The results are presented in Table 3.

Table 3

Reactor Coolant System Water

Unit	Analyte	Licensee Result	NRC Result	NRC Random Uncertainty	Ratio: Licensee/NRC	Agreement Range
U1	Cs-134	3.06E-03	3.08E-03	2.80E-04	0.99	0.6-1.66
U1	Tc-99m	0.00E+00	7.60E-04	1.36E-04	0	0.5-2.00
U1	I-131	2.32E-02	2.40E-02	3.90E-04	0.97	0.80-1.25
U1	I-132	3.15E-02	2.96E-02	6.40E-04	1.06	0.75-1.33
U1	I-133	3.31E-02	3.49E-02	4.00E-04	0.95	0.80-1.25
U1	I-134	4.73E-02	4.04E-02	2.88E-03	1.17	0.6-1.66
U1	I-135	3.66E-02	3.57E-02	1.53E-03	1.03	0.75-1.33
U1	Cs-137	4.17E-03	3.94E-03	2.08E-04	1.06	0.75-1.33
U1	Cs-138	1.79E-01	1.93E-01	2.01E-02	0.93	0.6-1.66
U2	Cs-134	2.55E-03	3.08E-03	2.80E-04	0.83	0.6-1.66
U2	Tc-99m	5.32E-04	7.60E-04	1.36E-04	0.7	0.5-2.00
U2	I-131	2.37E-02	2.40E-02	3.90E-04	0.99	0.80-1.25

U2	I-132	2.65E-02	2.96E-02	6.40E-04	0.89	0.75-1.33
U2	I-133	3.30E-02	3.49E-02	4.00E-04	0.95	0.80-1.25
U2	I-134	3.80E-02	4.04E-02	2.88E-03	0.94	0.6-1.66
U2	I-135	3.43E-02	3.57E-02	1.53E-03	0.96	0.75-1.33
U2	Cs-137	3.70E-03	3.94E-03	2.08E-04	0.94	0.75-1.33
U2	Cs-138	1.63E-01	1.93E-01	2.01E-02	0.85	0.6-1.66
U3	Cs-134	2.44E-03	3.08E-03	2.80E-04	0.79	0.6-1.66
U3	Tc-99m	4.77E-04	7.60E-04	1.36E-04	0.63	0.5-2.00
U3	I-131	2.17E-02	2.40E-02	3.90E-04	0.9	0.80-1.25
U3	I-132	2.78E-02	2.96E-02	6.40E-04	0.94	0.75-1.33
U3	I-133	3.26E-02	3.49E-02	4.00E-04	0.93	0.80-1.25
U3	I-134	3.65E-02	4.04E-02	2.88E-03	0.9	0.6-1.66
U3	I-135	3.65E-02	3.57E-02	1.53E-03	1.02	0.75-1.33
U3	Cs-137	3.75E-03	3.94E-03	2.08E-04	0.95	0.75-1.33
U3	Cs-138	1.41E-01	1.93E-01	2.01E-02	0.73	0.6-1.66

The Unit 2 and Unit 3 analyses agreed with NRC. All units demonstrated good correspondence of radioiodine activity, demonstrating accurate dose equivalent I-131 measurements. The initial Unit 1 analysis detected the 140.5 keV emission of Tc-99m, but rejected the identification based on very high counting uncertainty. This gamma ray was also rejected from the sample of coolant suspended solids. The results of the coolant suspended solids filter analysis are given in Table 4.

Table 4

Reactor Coolant Suspended Solids

Unit	Analyte	Licensee Result	NRC Result	NRC Random Uncertainty	Ratio: Licensee/NRC	Agreement Range
U1	Cr-51	7.10E-05	7.95E-05	1.11E-05	0.89	0.5-2.00
U1	Co-58	3.87E-04	3.74E-04	3.70E-06	1.04	0.80-1.25
U1	Co-60	9.13E-06	9.54E-06	1.28E-06	0.96	0.5-2.00
U1	Sb-122	4.10E-04	3.94E-04	4.40E-06	1.04	0.80-1.25
U1	Sb-124	1.76E-04	1.50E-04	4.70E-06	1.17	0.75-1.33
U1	Ba-139	5.47E-04	6.16E-04	3.37E-05	0.89	0.75-1.33
U1	Nb-95	6.77E-06	5.85E-06	9.74E-07	1.16	0.5-2.00
U1	Nb-97	0.00E+00	7.50E-06	1.24E-06	0	0.5-2.00
U1	Zr-97	7.13E-06	4.85E-06	9.24E-07	1.47	0.5-2.00
U1	Tc-99m	0.00E+00	2.89E-06	6.30E-07	0	0.5-2.00
U1	I-131	3.69E-05	3.58E-05	2.08E-06	1.03	0.75-1.33
U1	I-132	4.94E-05	5.07E-05	4.89E-06	0.97	0.6-1.66
U1	I-133	5.07E-05	5.15E-05	2.61E-06	0.98	0.75-1.33
U1	Cs-137	2.96E-05	2.71E-05	1.44E-06	1.09	0.75-1.33
U2	Cr-51	6.98E-05	7.95E-05	1.11E-05	0.88	0.5-2.00
U2	Co-58	4.04E-04	3.74E-04	3.70E-06	1.08	0.80-1.25
U2	Co-60	1.18E-05	9.54E-06	1.28E-06	1.24	0.5-2.00
U2	Sb-122	4.07E-04	3.94E-04	4.40E-06	1.04	0.80-1.25
U2	Sb-124	1.63E-04	1.50E-04	4.70E-06	1.08	0.75-1.33

U2	Ba-139	6.87E-04	6.16E-04	3.37E-05	1.11	0.75-1.33
U2	Nb-95	7.17E-06	5.85E-06	9.74E-07	1.22	0.5-2.00
U2	Nb-97	1.45E-04	7.50E-06	1.24E-06	19.36	0.5-2.00
U2	Zr-97	6.10E-06	4.85E-06	9.24E-07	1.26	0.5-2.00
U2	Tc-99m	2.33E-06	2.89E-06	6.30E-07	0.8	0.5-2.00
U2	I-131	3.31E-05	3.58E-05	2.08E-06	0.93	0.75-1.33
U2	I-132	1.06E-05	5.07E-05	4.89E-06	0.21	0.6-1.66
U2	I-133	5.07E-05	5.15E-05	2.61E-06	0.98	0.75-1.33
U2	Cs-137	2.79E-05	2.71E-05	1.44E-06	1.03	0.75-1.33
U3	Cr-51	8.01E-05	7.95E-05	1.11E-05	1.01	0.5-2.00
U3	Co-58	4.18E-04	3.74E-04	3.70E-06	1.12	0.80-1.25
U3	Co-60	1.17E-05	9.54E-06	1.28E-06	1.22	0.5-2.00
U3	Sb-122	4.32E-04	3.94E-04	4.40E-06	1.1	0.80-1.25
U3	Sb-124	1.68E-04	1.50E-04	4.70E-06	1.12	0.75-1.33
U3	Ba-139	7.83E-04	6.16E-04	3.37E-05	1.27	0.75-1.33
U3	Nb-95	8.09E-06	5.85E-06	9.74E-07	1.38	0.5-2.00
U3	Nb-97	1.21E-05	7.50E-06	1.24E-06	1.61	0.5-2.00
U3	Zr-97	1.08E-05	4.85E-06	9.24E-07	2.24	0.5-2.00
U3	Tc-99m	0.00E+00	2.89E-06	6.30E-07	0	0.5-2.00
U3	I-131	3.91E-05	3.58E-05	2.08E-06	1.09	0.75-1.33
U3	I-132	4.53E-05	5.07E-05	4.89E-06	0.89	0.6-1.66
U3	I-133	5.51E-05	5.15E-05	2.61E-06	1.07	0.75-1.33
U3	Cs-137	2.79E-05	2.71E-05	1.44E-06	1.03	0.75-1.33

Again, the initial Unit 1 analysis did not quantify Tc-99m from the identified 140.5 keV line because of high uncertainty. In addition, the Unit 1 analysis did not resolve the low-level 657.9 keV gamma ray from Nb-97 from the compton scatter resulting from the 661.6 keV gamma ray from Cs-137. A software adjustment for discrimination between background counts and net gamma counts differed between the Unit counting systems. The Unit 1 gamma peak detection software was adjusted to conform to the methods used by Units 2 and 3, and the Tc-99m was identified. Nb-97 was not identified despite the adjustment, but accounted for less than 0.4% of sample gamma activity, and therefore was not significant to the identification of 95% of radionuclides in coolant per the definition of E-BAR and Technical Specification 4.4.7, and typically was identified after the decay of shorter-lived radionuclides during E-BAR surveillances.

The inspector verified that Unit 1 analyses identified nuclides at the required detection limits for liquid releases to the evaporation pond, and concluded that the Unit 1 software would adequately identify radionuclides as required. Unit 1 personnel stated that a gamma spectrometer system similar to those used by Units 2 and 3 had been procured and was expected to yield more consistent results between the laboratories.

The Unit 3 analysis of the filter also did not identify Tc-99m. The compton scattering from the predominant 165.8 keV gamma ray from Ba-139 obscured the low-level Tc-99m. During later analyses by the other laboratories, Ba-139 had decayed and Tc-99m was more easily identified.

Both the Unit 2 and Unit 3 analyses differed from NRC in their assumptions on equilibrium between Zr-97 and its daughter, Nb-97. The NRC assumed these radionuclides were in equilibrium. The Unit 2 radionuclide library did not assume an equilibrium, and assigned Nb-97 its own half-life. The inspector concluded that the licensee's assumption would result in a conservative measurement. The Unit 3 library improperly assigned the half-life of Nb-97 to its parent, Zr-97, resulting in a conservative disagreement. Unit 3 chemistry personnel were informed of the error and immediately corrected the library.

The Unit 2 analysis of I-132 disagreed due to the use of the parent Te-132 half-life for daughter I-132 in the library. The library was specifically intended for filters allowed to decay during E-BAR surveillances and outages. Unit 2 analyzed effluent and reactor coolant dose equivalent I-131 surveillance samples using the appropriate I-132 half-life.

The next sample was gas from Unit 1 containment. The results are given in Table 5.

Table 5

Unit 1 Containment Gas

Unit	Analyte	Licensee Result	NRC Result	NRC Random Uncertainty	Ratio: Licensee/NRC	Agreement Range
U1	Ar-41	2.67E-06	2.88E-06	1.54E-07	0.93	0.75-1.33
U1	Kr-85	2.02E-05	2.64E-05	5.60E-06	0.77	0.5-2.00
U1	Kr-85m	2.54E-07	2.57E-07	3.90E-08	0.99	0.5-2.00
U1	Xe-131m	1.28E-05	1.73E-05	8.30E-07	0.74	0.75-1.33
U1	Xe-133	1.11E-03	1.08E-03	1.00E-06	1.03	0.85-1.18
U1	Xe-133m	6.80E-06	7.37E-06	2.83E-07	0.92	0.75-1.33
U1	Xe-135	5.72E-06	6.15E-06	7.60E-08	0.93	0.80-1.25
U2	Ar-41	2.59E-06	2.88E-06	1.54E-07	0.9	0.75-1.33
U2	Xe-131m	1.80E-05	1.73E-05	8.30E-07	1.04	0.75-1.33
U2	Xe-133	1.03E-03	1.08E-03	1.00E-06	0.95	0.85-1.18
U2	Xe-133m	6.59E-06	7.37E-06	2.83E-07	0.89	0.75-1.33
U2	Xe-135	5.37E-06	6.15E-06	7.60E-08	0.87	0.80-1.25
U3	Ar-41	3.03E-06	2.88E-06	1.54E-07	1.05	0.75-1.33
U3	Kr-85	1.72E-05	2.64E-05	5.60E-06	0.65	0.5-2.00
U3	Kr-85m	2.26E-07	2.57E-07	3.90E-08	0.88	0.5-2.00
U3	Xe-131m	1.52E-05	1.73E-05	8.30E-07	0.88	0.75-1.33
U3	Xe-133	1.14E-03	1.08E-03	1.00E-06	1.06	0.85-1.18
U3	Xe-133m	6.97E-06	7.37E-06	2.83E-07	0.95	0.75-1.33
U3	Xe-135	6.02E-06	6.15E-06	7.60E-08	0.98	0.80-1.25

The results of the gas sample from Units 2 and 3 agreed. Kr-85 and Kr-85m were not compared with Unit 2 because of high counting uncertainties. The Unit 1 measurement of Xe-131m was in marginal disagreement. The inspector observed that the half-life employed for

Xe-131m was 12 days, not 11.8 days per the literature. The licensee immediately changed the half-life to the correct value.

The licensee's quality control of radioanalytical instruments was consistent with the guidance of Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs - Effluent Streams and the Environment." The results of quality control checks demonstrated satisfactory instrument performance.

The inspector requested the licensee obtain an additional reactor coolant sample for confirmatory measurement of Sr-89, Sr-90 and tritium. The coolant sample was split between each Unit and the NRC. The results will be compared in a subsequent inspection (50-528/90-56-01, 50-529/90-56-01; 50-530/90-56-02).

The licensee's capabilities had declined in this area, given several errors in the details of the nuclide libraries and the inconsistent nuclide identification by counting systems from different manufacturers. One item concerning quantification of particulates on iodine cartridges remained unresolved.

4. Chemistry Control and Analysis (79701)

The inspector toured unit laboratories and reviewed current and long-term chemistry data for condensate, feedwater (FW), steam generator (SG) blowdown and the reactor coolant system (RCS) to establish compliance with procedure 74AC-9CY04, Revision 3, "Systems Chemistry Specifications," and owners group chemistry guidelines.

The following trends were observed at Unit 1:

Analyte	Values Observed	Specification Limit
RCS Chloride	< 10 ppb	< 150 ppb
RCS Fluoride	< 8 ppb	< 100 ppb
RCS Oxygen	5-15 ppb	< 100 ppb
RCS Sulfate	< 5 ppb	< 50 ppb
RCS Dose Eq. I-131	5E-2 uCi/gm	1 uCi/gm
SG Sodium	< 5 ppb	< 20 ppb
SG Chloride	2-5 ppb	< 20 ppb
SG Sulfate	2 ppb	< 15 ppb
SG Cation Conductivity	0.1 uS/cm	< 0.8 uS/cm
Condensate Oxygen	2 ppb	< 10 ppb
Feedwater Iron	5-10 ppb	< 20 ppb

The following trends were observed at Unit 2:

Analyte	Values Observed	Specification Limit
RCS Chloride	4-10 ppb	< 150 ppb
RCS Fluoride	2-4 ppb	< 100 ppb
RCS Oxygen	< 5 ppb	< 100 ppb
RCS Sulfate	< 2 ppb	< 50 ppb

RCS Dose Eq. I-131	2E-2 uCi/gm	1 uCi/gm
SG Sodium	2-5 ppb	< 20 ppb
SG Chloride	< 2 ppb	< 20 ppb
SG Sulfate	1-2 ppb	< 15 ppb
SG Cation Conductivity	0.08 uS/cm	< 0.8 uS/cm
Condensate Oxygen	2 ppb	< 10 ppb
Feedwater Iron	10 ppb	< 20 ppb

The following trends were observed at Unit 3:

Analyte	Values Observed	Specification Limit
RCS Chloride	2-3 ppb	< 150 ppb
RCS Fluoride	2 ppb	< 100 ppb
RCS Oxygen	< 5 ppb	< 100 ppb
RCS Sulfate	< 2 ppb	< 50 ppb
RCS Dose Eq. I-131	4E-2 uCi/gm	1 uCi/gm
SG Sodium	4-9 ppb	< 20 ppb
SG Chloride	1-2 ppb	< 20 ppb
SG Sulfate	1-2 ppb	< 15 ppb
SG Cation Conductivity	0.08 uS/cm	< 0.8 uS/cm
Condensate Oxygen	< 1 ppb	< 10 ppb
Feedwater Iron	5-10 ppb	< 20 ppb

The inspector noted several significant improvements since the last inspection. A new constant lithium RCS chemistry was employed to maintain a higher RCS pH. Logs demonstrated good coordination of boron and lithium within the required range at each unit. This chemistry has been shown to decrease rates of activation product plateout in RCS piping and components, resulting in lower radiation dose rates.

Anion impurities and cation conductivity in steam generators were improved at each unit. Operation of the secondary system at a pH of 9.0 to 9.1 had appeared to benefit the condensate polishing demineralizer systems, improving decontamination factors for these ions. Also, contaminants from the polisher system itself were reduced. Condensate dissolved oxygen was also very low at each unit, indicative of good condenser integrity.

Feedwater metals were within acceptable limits, and well-controlled considering the relatively low pH maintained in the secondary system. The chemistry general manager stated that an ongoing study of corrosion products in the secondary system versus system pH would assist the licensee in identifying the best pH regime for the system.

Quality control data and calibration regimes for chemistry instrumentation were consistent with the licensee's laboratory analytical control program. The inspector noted that instruments were calibrated at multiple standard concentrations; no single point calibrations were observed for atomic absorption/emission spectrophotometers metal analyses or ion chromatographs. Quality control standards were prepared from independent reagent stock and at independent concentrations appropriate for the analysis. The results of quality control analyses demonstrated satisfactory instrument performance.

In recognition of the increasing sophistication of the analytical chemistry instrumentation, the licensee had designated individuals to serve as technical advisors for instrumentation. Within their assigned areas the technical advisors were assigned instrument calibration, quality control, development of analytical methods and troubleshooting. This allowed in-depth specialization by the advisor to improve instrument performance while freeing technicians to perform other duties.

The improvements in the laboratory analytical control program were confirmed by the analytical chemistry cross-check program data. The licensee's measurements of vendor-supplied chemistry blind samples were competitive with other participants in the program. No severe outliers were observed. Intralaboratory control samples showed technician proficiency steadily improving for virtually all analyses, with the exception of the total organic carbon analysis. The licensee suspected that samples for organic carbon analysis had been affected by shipping and storage conditions and intended to improve performance by careful handling of the blind samples.

The inspector inventoried the available on-line monitors for those variables recommended for continuous monitoring by industry secondary chemistry guidelines. The inspector noted that the inventory of on-line monitors had improved since the previous inspection. For example, new sodium monitors for the steam generators and a microcomputer for monitor control and trending had been installed. However, the inspector also observed that some of the monitors were not reliable. Sodium, a control variable, could only be measured by grab samples at Unit 2, and sodium monitors were only partially available at Units 1 and 3. Condensate dissolved oxygen monitors were not operating at Units 2 and 3. Many of the inoperable monitors were under work clearances for replacement.

The licensee did not possess on-line ion chromatography. This capability was due to be installed during the 1991 and 1992 refueling outages.

The licensee's performance in analytical chemistry and system water quality had improved. However, the licensee lacked several recommended on-line monitoring instruments for important secondary chemistry measurements.

5. Allegation RV-90-A-0069

In November 1990, Region V had received an allegation that a licensee employee had been intimidated and discriminated against by licensee management for discussing technical information with an NRC inspector. During the course of this inspection, the inspectors interviewed the licensee employee and several other cognizant individuals. The inspectors discovered no evidence to substantiate that licensee management had acted to intimidate or discriminate against the employee. The inspectors presented the substance of the allegation to the licensee at the exit meeting.

6. Exit Meeting

The inspectors met with licensee management on December 7, 1990, to discuss the scope and findings of the inspection. The inspectors explained the sequence of events surrounding Allegation RV-A-0069 and informed the licensee of their conclusions.

Enclosure

Criteria for Accepting the Licensee's Measurements

Resolution	Ratio
<4	No comparison
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
200	0.85 - 1.18

Comparison

1. Divide each NRC result by its associated uncertainty to obtain the resolution. (Note: For purposes of this procedure, the uncertainty is defined as the relative standard deviation, one sigma, of the NRC result as calculated from counting statistics.)

2. Divide each licensee result by the corresponding NRC result to obtain the ratio (licensee result/NRC).

3. The licensee's measurement is in agreement if the value of the ratio falls within the limits shown in the preceding table for the corresponding resolution.